

II. Rejection of Claims 1 to 5 Under 35 U.S.C. § 112

Claims 1 to 5 were rejected under 35 U.S.C. § 112, second paragraph as indefinite for allegedly failing to particularly point out and distinctly claim the subject matter of the invention.

As regards the "drying the quartz or high aluminum-oxide-containing tube" appearing twice in claim 1, the Examiner's attention is directed, for example, to page 4, lines 19 to 25 of the Specification, which states that the method includes "cleaning the tube body 12 and subsequently drying the same" and "spreading the coating material and drying the same." Accordingly, the Specification describes two drying steps, and claim 1 as filed included two steps of "drying the quartz or high aluminum-oxide-containing tube." However, the Office Action states that "the claim [is treated] as only requiring one drying step." Office Action at p. 3. To facilitate matters, claim 1 has been amended herein without prejudice to recite "drying the quartz or high aluminum-oxide-containing tube in a first drying step" and "drying the quartz or high aluminum-oxide-containing tube in a second drying step." It is therefore respectfully submitted that claim 1 as amended herein more clearly recites that the method includes two drying steps.

As regards the term "high" in the context of "high aluminum-oxide-containing tube," the Office Action states that "[f]or purposes of applying art, the term 'high' has been treated as inclusive of any amount of aluminum oxide." Office Action at p. 3. However, the term "high" in the context of "high aluminum-oxide-containing tube" refers to a tube made of a material having properties similar to the properties of a quartz tube. In this regard, the Examiner's attention is directed to, for example, page 3, lines 13 to 17 of the Specification, which state that "tubes made of quartz or high aluminum-oxide-containing materials are chosen to serve as ozone generating tubes, and gold is selected as the coating metal for the reasons that quartz or high aluminum-oxide-containing materials can endure a temperature above 1400°C and gold is a good conductor." The Examiner's attention is further directed to page 3, lines 25 to 26 of the Specification, which state that "quartz tubes or high aluminum-oxide-containing tubes are used as dielectric, and are able to endure temperature above 1400°C," and to page 4, lines 15 to 17, which state that "the tube body 12 is made of materials, such as quartz or high aluminum-oxide-containing materials, which has the property of enduring temperature above 1400°C."

In view of the foregoing, it is respectfully submitted that the Specification plainly describes certain aspects of the high aluminum-oxide-containing tube that belie the unrestricted and unreasonable reading of the term "high" in the context of "high aluminum-oxide-containing tube" to be "inclusive of any amount of aluminum oxide" as asserted in the Office Action.

In this regard, the Office Action ignores the case law, which plainly supports the foregoing and which provides that the terms of a claim must be given "reasonable interpretations" based on the Specification -- and not simply any broad and unrestricted reading of those terms. See In re Weiss, 26 U.S.P.Q.2d 1885, 1887 (Fed. Cir. 1993) (when interpreting a claim term or phrase, one must "look to the specification for the meaning ascribed to that term"; Board reversed) (unpublished decision); In re Okuzawa, 190 U.S.P.Q. 464, 466 (C.C.P.A. 1976) ("claims are not to be read in a vacuum, and limitations therein are to be interpreted in light of the specification in giving them their broadest reasonable interpretation"; Board reversed; emphasis in original) (citing In re Royka, 180 U.S.P.Q. 580, 582 to 83 (C.C.P.A. 1974) (claims are "not to be read in a vacuum and while it is true that they are to be given the broadest reasonable interpretation during prosecution, their terms still have to be given the meaning called for by the specification of which they form a part"; Board reversed; emphasis in original); and In re Rohrbacher, 128 U.S.P.Q. 117, 119 (C.C.P.A. 1960) (an "applicant is his own lexicographer and words used in his claims are to be interpreted in the sense in which they are used in the specification"; Board reversed)). It is respectfully submitted that this is exactly the case here since contrary to the foregoing law, the Office Action simply reflects its own unreasonable reading of "high" in the context of "high aluminum-oxide-containing tube" without regard to the sense in which that phrase is used in the present application.

As regards the term "uniformly" and the phrase "free of defects," while Applicants respectfully disagree with the merits of the rejection based on this term and phrase, to facilitate matters, claim 1 has been amended herein without prejudice to delete the phrase "to see if the film is formed uniformly and free of defects."

As regards the phrase "smearing the prepared the coating material," the Examiner will note that claim 1 has been amended herein without prejudice to change "smearing the prepared the coating material" to --smearing the prepared coating material--.

In view of the foregoing, it is respectfully submitted that claims 1 to 5 fully comply with the requirements of 35 U.S.C. § 112, and withdrawal of this rejection is therefore respectfully requested.

III. Rejection of Claim 1 Under 35 U.S.C. § 103(a)

Claim 1 was rejected under 35 U.S.C. § 103(a) as unpatentable over the combination of U.S. Patent No. 3,653,946 ("Fefferman"), U.S. Patent No. 2,984,575 ("Fitch") and U.S. Patent No. 5,795,841 ("Kuerschner et al."). Applicants respectfully submit that the combination of Fefferman, Fitch and Kuerschner et al. does not render obvious claim 1 for the following reasons.

Claim 1 relates to a method of gilding quartz or high aluminum-oxide-containing tube. Claim 1 recites that the method includes preparing coating material which contains gold, cleansing the quartz or high aluminum-oxide-containing tube, drying the quartz or high aluminum-oxide-containing tube in a first drying step, smearing the prepared coating material on the quartz or high aluminum-oxide-containing tube to form a film thereon, drying the quartz or high aluminum-oxide-containing tube in a second drying step, inspecting the dried quartz or high aluminum-oxide-containing tube, putting the dried quartz or high aluminum-oxide-containing tube into a stove, which is maintained at the temperature between 780 to 880°C, to bake for 10 to 14 hours, and retrieving the tube after the temperature in the stove is below 110°C, and putting the tube under room temperature.

Fefferman purports to relate to a method of depositing an adherent gold film on the surfaces of a suitable substrate, Fitch purports to relate to gold tertiary mercaptides and method for the preparation thereof, and Kuerschner et al. purport to relate to a process for producing coated, nonporous support materials. The Office Action contends that Fefferman describes "preparing a coating material which contains gold[,] cleansing the substrate . . . , which may be alumina[,] brushing . . . the prepared coating material on the substrate to form a film thereon[,] drying the substrate[,] baking the substrate at a temperature of 427-1054°C to form a gold film[,] and cooling the substrate to room temperature." Office Action at p. 4. The Office Action admits that Fefferman does not disclose that the substrate is tubular, does not disclose baking at 780 to 880°C for 10 to 14 hours and does not disclose that the substrate is removed from the stove after the temperature has been reduced to room temperature. Office Action at pp. 4 to 5. As regards the

tubular substrate, the Office Action contends that Fitch describe that decorative gold coatings may be provided for tubular ceramic substrates. As regards the baking at 780 to 880°C for 10 to 14 hours, the Office Action states that Fefferman discloses a temperature range that overlaps the claimed temperature range but admits that the baking time described by Fefferman is shorter than the claimed baking time. The Office Action contends that Kuerschner et al. describe that "adhesion of metals, such as gold . . . , to ceramic substrates, such as alumina or quartz . . . may be improved by heating at 200-1000°C for 0.5 to 24 hours." Office Action at p. 5. The Office Action contends that "[i]t would have been obvious to one of ordinary skill in the art at the time the invention was made to have selected a temperature and time form [sic] within the claimed ranges because [Kuerschner et al.] disclose[] that they are operative for increasing the adhesion of metals to ceramics." Office Action at p. 5.

Applicants respectfully submit that the description by Kuerschner et al. of a broad range of 200 to 1000°C for the broad time range of 0.5 to 24 hours, when combined with Fefferman and Fitch as proposed in the Office Action, does not render obvious claim 1 for at least the reason that due to severe requirements of electrodes used in an ozone generator, e.g., high temperature, high electric current, high voltage, etc., the particular ranges of baking temperature and the temperature at which the tube, which is used as an electrode, is retrieved from the stove are crucial. The temperature range of 427 to 1054°C, described by Fefferman, and the temperature range of 200 to 1000°C, described by Kuerschner et al., are too broad to satisfy the requirements of a gold film applied to a quartz tube or high aluminum-oxide-containing tube according to the present invention. In this regard, the Examiner's attention is directed to, for example, page 3, lines 19 to 23 of the Specification, which state that "[t]he coating made by [the method of the present invention] adheres well on the surface such that it will not easily scale off under the impact of electrons at high frequency and high voltage" and that "high frequency is defined at the range of 15KHz to 40KHz; and the high voltage is defined at a peak-to-peak value from 10KV to 18KV." Moreover, none of the references relied upon disclose, or even suggest, a method of gilding a quartz tube or a high aluminum-oxide-containing tube that is to be used under such severe conditions.

As further regards the "retrieving the tube after the temperature in the stove is below 110°C," the Office Action contends that Fefferman describes "that the

cooling of the substrate should be controlled in order to reduce stress" and that "[t]he Examples indicate that this may be done by leaving the substrate in the furnace . . . until a certain temperature is reached." Office Action at p. 5. However, Fefferman state at col. 4, lines 46 to 48 that "[t]he substrate was allowed to cool slowly through normal radiation . . . to 400°F [approximately 204°C] whereupon it was removed from the furnace" (emphasis added). See also, col. 5, lines 4 to 6. Accordingly, Fefferman does not disclose, or even suggest, "retrieving the tube after the temperature in the stove is below 110°C" as recited in claim 1. As to the unsupported contention that the description of Fefferman "at col. 5, lines 10-12 makes it appear that the substrate may also be left in the oven until it reaches room temperature," the Office Action is merely relying on speculation as to the statement of Fefferman located at col. 5, lines 10 to 12, to wit, "[a]fter reaching 1,200°F, the substrate is allowed to cool slowly through normal radiation to room temperature (3 hours)." It is respectfully submitted that the statement that "[a]fter reaching 1,200°F, the substrate is allowed to cool slowly through normal radiation to room temperature (3 hours)" does not provide a disclosure, or even a suggestion, of "retrieving the tube after the temperature in the stove is below 110°C, and putting the tube under room temperature" as recited in claim 1.

In support of the criticality of the ranges of the baking parameters and of the retrieving parameters, enclosed herewith is an Affidavit of Kuang-Lang Huang, which sets forth, inter alia, that: above 880°C, a gold coating may evaporate; below 780°C, a gold coating may not adhere well to the surface of a tube made of quartz or Al₂O₃; and for electrodes of an ozone generator, a baking temperature maintained in the range between 780°C and 880°C is crucial. The Affidavit further sets forth benefits of retrieving the tube when its temperature drops below 110°C. The enclosed Affidavit, therefore, sets forth the criticality of the temperature parameters recited in claim 1 and sets for unexpected results achieved thereby.

In rejecting a claim under 35 U.S.C. § 103(a), the Examiner bears the initial burden of presenting a prima facie case of obviousness. In re Rijckaert, 9 F.3d 1531, 1532, 28 U.S.P.Q.2d 1955, 1956 (Fed. Cir. 1993). To establish prima facie obviousness, three criteria must be satisfied. First, there must be some suggestion or motivation to modify or combine reference teachings. In re Fine, 837 F.2d 1071, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988). This teaching or suggestion to make the claimed combination must be found in the prior art and not based on the

application disclosure. In re Vaeck, 947 F.2d 488, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991). Second, there must be a reasonable expectation of success. In re Merck & Co., Inc., 800 F.2d 1091, 231 U.S.P.Q. 375 (Fed. Cir. 1986). Third, the prior art reference(s) must teach or suggest all of the claim limitations. In re Royka, 490 F.2d 981, 180 U.S.P.Q. 580 (C.C.P.A. 1974). As indicated above, none of the references relied upon disclose, or even suggest, the critical parameters of "putting the dried quartz or high aluminum-oxide-containing tube in a stove, which is maintained at the temperature between 780 to 880°C, to bake for 10 to 14 hours" or of "retrieving the tube after the temperature in the stove is below 110°C, and putting the tube under room temperature" as recited in claim 1. It is therefore respectfully submitted that the combination of Fefferman, Fitch and Kuerschner et al. does not render obvious claim 1. The criticality of the temperature parameters and the unexpected results achieved by the critical temperature parameters recited in claim 1 are further evidence of the non-obviousness of claim 1.

Moreover, it is respectfully submitted that the cases of In re Fine, supra, and In re Jones, 21 U.S.P.Q.2d 1941 (Fed. Cir. 1992), make plain that the Office Action's generalized assertions that it would have been obvious to modify or combine the references do not properly support a § 103 rejection. It is respectfully submitted that those cases make plain that the Office Action reflects a subjective "obvious to try" standard, and therefore does not reflect the proper evidence to support an obviousness rejection based on the references relied upon. In particular, the Court in the case of In re Fine stated that:

The PTO has the burden under section 103 to establish a *prima facie* case of obviousness. It can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references. This it has not done. . . .

Instead, the Examiner relies on hindsight in reaching his obviousness determination. . . . One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention.

In re Fine, 5 U.S.P.Q.2d at 1598 to 1600 (citations omitted; italics in original; emphasis added). Likewise, the Court in the case of In re Jones stated that:

Before the PTO may combine the disclosures of two or more prior art references in order to establish *prima facie* obviousness, there must be some suggestion for doing so, found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. . . .

Conspicuously missing from this record is any evidence, other than the PTO's speculation (if it be called evidence) that one of ordinary skill . . . would have been motivated to make the modifications . . . necessary to arrive at the claimed [invention].

In re Jones, 21 U.S.P.Q.2d at 1943, 1944 (citations omitted; italics in original).

That is exactly the case here since it is believed and respectfully submitted that the present Office Action offers no evidence whatsoever, but only conclusory hindsight, reconstruction and speculation, which these cases have indicated does not constitute evidence that will support a proper obviousness finding. Unsupported assertions are not evidence as to why a person having ordinary skill in the art would be motivated to modify or combine references to provide the claimed subject matter of the claims to address the problems met thereby. Accordingly, the Office must provide proper evidence of a motivation for modifying or combining the references to provide the claimed subject matter.

More recently, the Federal Circuit in the case of In re Kotzab has made plain that even if a claim concerns a "technologically simple concept" -- which is not the case here -- there still must be some finding as to the "specific understanding or principle within the knowledge of a skilled artisan" that would motivate a person having no knowledge of the claimed subject matter to "make the combination in the manner claimed," stating that:

In this case, the Examiner and the Board fell into the hindsight trap. The idea of a single sensor controlling multiple valves, as opposed to multiple sensors controlling multiple valves, is a technologically simple concept. With this simple concept in mind, the Patent and Trademark Office found prior art statements that in the abstract appeared to suggest the claimed limitation. But, there was no finding as to the specific understanding or principle within the knowledge of a skilled artisan that would have motivated one with no knowledge of Kotzab's invention to make the combination in the manner claimed. In light of our holding of the absence of a motivation to

combine the teachings in Evans, we conclude that the Board did not make out a proper prima facie case of obviousness in rejecting [the] claims . . . under 35 U.S.C. Section 103(a) over Evans.

In re Kotzab, 55 U.S.P.Q.2d 1313, 1318 (Fed. Cir. 2000) (emphasis added). Again, it is believed that there have been no such findings.

Accordingly, there is no evidence that the references relied upon, whether taken alone, combined or modified, would provide the features and benefits of claim 1. It is therefore respectfully submitted that claim 1 is allowable for these reasons.

IV. Rejection of Claims 2 to 5 Under 35 U.S.C. § 103(a)

Claims 2 to 5 were rejected under 35 U.S.C. § 103(a) as unpatentable over the combination of Fefferman, Fitch, Kuerschner et al. and U.S. Patent No. 5,759,230 ("Chow et al."). Applicants respectfully submit that the combination of Fefferman, Fitch, Kuerschner et al. and Chow et al. does not render obvious the present claims for the following reasons.

Claims 2 to 5 ultimately depend from claim 1 and therefore include all of the limitations of claim 1. As more fully set forth above, the combination of Fefferman, Fitch and Kuerschner et al. fails to disclose, or even suggest, all of the limitations of claim 1. Moreover, the enclosed Affidavit of Kuang-Lang Huang, which sets forth the criticality of the baking and retrieving parameters and unexpected results achieved thereby, provides evidence of non-obviousness of claim 1. Chow et al. are not relied upon to cure the critical deficiencies of Fefferman, Fitch and Kuerschner et al. Indeed, Chow et al. do not cure the critical deficiencies of Fefferman, Fitch and Kuerschner et al. in that Chow et al. at least do not disclose, or even suggest, the limitations of claim 1 not disclosed or suggested by the combination of Fefferman, Fitch and Kuerschner et al. Accordingly, it is respectfully submitted that the combination of Fefferman, Fitch, Kuerschner et al. and Chow et al. does not render obvious claims 2 to 5, which ultimately depend from claim 1. In re Fine, supra (any dependent claim that depends from a non-obvious independent claim is non-obvious).

V. New Claims 9 and 10

New claims 9 and 10 have been added herein. It is respectfully submitted that new claims 9 and 10 do not add any new matter and are fully supported by the present application, including the Specification. It is respectfully submitted that these claims are allowable.

VI. Conclusion

Attached hereto is a marked-up version of the changes made to the claims by the current Amendment. The attached page is captioned "**Version with Markings to Show Changes Made.**"

It is therefore respectfully submitted that all of the presently pending claims are allowable. All issues raised by the Examiner having been addressed, an early and favorable action on the merits is earnestly solicited.

Respectfully submitted,

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26646

PATENT TRADEMARK OFFICE



Application Serial No. 09/782,072

VERSION WITH MARKINGS TO SHOW CHANGES MADE

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IN THE CLAIMS:

New claims 9 and 10 have been added.

Claim 1 has been amended without prejudice as follows:

1. (Amended) A method of gilding quartz or high aluminum-oxide-containing tube, comprising:
 - preparing coating material which contains gold;
 - cleansing the quartz or high aluminum-oxide-containing tube;
 - drying the quartz or high aluminum-oxide-containing tube in a first drying step;
 - smearing the prepared [the] coating material on the quartz or high aluminum-oxide-containing tube to form a film thereon;
 - drying the quartz or high aluminum-oxide-containing tube in a second drying step;
 - inspecting the dried quartz or high aluminum-oxide-containing tube [to see if the film is formed uniformly and free of defects];
 - putting the dried quartz or high aluminum-oxide-containing tube into a stove, which is maintained at the temperature between 780 to 880°C, to bake for 10 to 14 hours; and
 - retrieving the tube after the temperature in the stove is below 110°C, and putting the tube under room temperature.

AFFIDAVIT

I, Kuang-Lang Huang of No. 1 Lane 328, Fu-Te 1st Road, Hsi-Chih City, Taipei County 221 Taiwan, R.O.C. do hereby make oath and say as follows:

- I. I am one of the co-inventors of the subject patent application. I have a Ph.D. degree of physics of National Taiwan University, and presently working as the engineer in chief in AirTree Ozone Technology Co., Ltd. I have been working in this position for more than three years. My professional specialty is in the field of the manufacturing of ozone generator, molecular dynamics, and spectroscopy. I can and do attest that the facts stated below are true and correct to the best of my knowledge.
- II. The method of gilding according to the present invention is primarily applied to the electrodes in ozone generators, wherein the requirements on the quality of coating are substantially different from those of general gold plating. Under the operating conditions for ozone generators, the electrodes are required to withstand high temperature, high electric current, and high voltage.
- III. Baking temperature maintained in a range between 780°C and 880°C is patentably distinguishable from the prior art:
 - (1) While the temperature is above 880°C , the Au (gold) coating may evaporate and thereby thinning the coating thickness and ultimately increasing the manufacturing cost.
 - (2) While the temperature is below 780°C , the Au coating may not adhere well to the surface of tube made of quartz and Al_2O_3 , particularly when the tube is used as the electrodes of an ozone generator, in which the electrodes have to endure high temperature, high electric current, and high voltage. Scaling of Au coating from the tube surface may decrease the efficiency of the ozone generator or even cause damages to the ozone generator.
 - (3) For Au coating used for general purposes, a range of baking temperature greater than 780°C and 880°C is acceptable. However, if the Au coating is to be used in the electrodes of an ozone generator, in which the electrodes must withstand high temperature, high electric current, and high voltage, the baking temperature maintained in the range between 780°C and 880°C is crucial.
- IV. The tube retrieving temperature of 110°C is patentably distinguishable

from the prior art:

- (1) The tube with coating retrieved at temperature below 500°C is generally acceptable, but may have the following problems:
 - a. If the substrate (tube) made of Al_2O_3 is retrieved from the stove at 500°C while the environment is around 25°C (room temperature), the rapid temperature reduction in the tube would tend to crack the tube. Such a cracking phenomenon due to rapid temperature reduction is not frequently found in a tube made of quartz.
 - b. However, the adherence of the Au coating on the tube made of quartz or Al_2O_3 may worsen under the condition of rapid cooling, and that will result in reduction of efficiency of the ozone generator.
- (2) In order to obtain high quality of coating, it is recommended that the tube be retrieved when its temperature drops to 110°C. The temperature of 110°C is preferred because the higher the temperature at which the tube is retrieved, the worse the quality of the coating will be obtained. On the other hand, the lower the temperature the tube is retrieved, the more the time elapses, and therefore the throughput of the ozone generator will be significantly reduced. It means that the cost of manufacturing will be increased.

I declare that the foregoing is true and correct.

Dated this 28 day of January, 2003

Kung-Lang Huang
Kung-Lang Huang